

Use and Limitations of a Climate-Quality Data Record to Study Temperature Trends on the Greenland Ice Sheet

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ABSTRACT

Enhanced melting of the Greenland Ice Sheet has been documented in recent literature along with surface-temperature increases measured using infrared satellite data since 1981. Using a recently-developed climate-quality data record, 11- and 12-year trends in the clear-sky ice-surface temperature (IST) of the Greenland Ice Sheet have been studied using the Moderate-Resolution Imaging Spectroradiometer (MODIS) IST product. Daily and monthly MODIS ISTs of the Greenland Ice Sheet beginning on 1 March 2000 and continuing through 31 December 2010 are now available at 6.25-km spatial resolution on a polar stereographic grid as described in Hall et al. (submitted). This record will be elevated in status to a climate-data record (CDR) when more years of data become available either from the MODIS on the Terra or Aqua satellites, or from the Visible Infrared Imager Radiometer Suite (VIIRS) to be launched in October 2011.

Maps showing the maximum extent of melt for the entire ice sheet and for the six major drainage basins have been developed from the MODIS IST dataset. Twelve-year trends of the duration of the melt season on the ice sheet vary in different drainage basins with some basins melting progressively earlier over the course of the study period. Some (but not all) of the basins also show a progressively-longer duration of melt. IST 12-year trends are compared with in-situ data, and climate data from the Modern Era Retrospective-Analysis for Research and Applications (MERRA) Reanalysis.

<http://modis-snow-ice.gsfc.nasa.gov>

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